CONTENTS

(Abstracted / Indexed in: Biol. Abstr., CAB International, CABS, Chem. Abstr., Curr. Contents AB & ES, Environ. Abstr. Environ. Period. Bibliogr., Excerpta Med., Focus On: Global Change, Geo. Abstr., Meterol. & Geoastrophys. Abstr., Oceanogr. Lit. Rev., PASCAL / CNRS, selected Water Resour. Abstr.)

Special Issue: Ecological Effects of Arctic Airborne Contaminants. A Collection of Papers Presented at the International Symposium on the Ecological Effects of Arctic Airborne Contaminants, Reykjavík, Iceland, 4–8 October 1993.

Preface xi

Sponsors xiii

Acknowledgements xv

Symposium Address xvii

Introductory session

Schindler, D.W., K.A. Kidd, D.C.G. Muir and W.L. Lockhart. The effects of ecosystem characteristics on contaminant distribution in northern freshwater lakes 1

Weller, G. Global pollution and its effect on the climate of the Arctic 19

Pathways of contaminants to the Arctic biosphere

Mackay, D. and F. Wania. Transport of contaminants to the Arctic: partitioning, processes and models 25

Pacyna, J.M. The origin of Arctic air pollutants: lessons learned and future research 39

Bidleman, T.F., R.L. Falconer and M.D. Walla. Toxaphene and other organochlorine compounds in air and water at Resolute Bay, N.W.T., Canada 55

Falconer, R.L., T.F. Bidleman and D.J. Gregor. Air-water gas exchange and evidence for metabolism of hexachlorocyclohexanes in Resolute Bay, N.W.T. 65

Chernyak, S.M., L.L. McConnell and C.P. Rice. Fate of some chlorinated hydrocarbons in Arctic and far eastern ecosystems in the Russian Federation 75

Egan, W.G., B.B. Murphey and A.W. Hogan. Meteorological analysis of chemical exchange events in the Arctic Basin 87

Genthon, C. and A. Armengaud. GCMs simulations of atmospheric tracers in the polar latitudes: South Pole (Antarctica) and Summit (Greenland) cases 101

Gregor, D.J., A.J. Peters, C. Teixeira, N. Jones and C. Spencer. The historical residue trend of PCBs in the Agassiz Ice Cap, Ellesmere Island, Canada 117

Jaffe, D., B. Cerundolo, J. Rickers, R. Stolzberg and A. Baklanov. Deposition of sulfate and heavy metals on the Kola Peninsula 127

Kelley, J.A., D.A. Jaffe, A. Baklanov and A. Mahura. Heavy metals on the Kola Peninsula: aerosol size distribution 135

Oehme, M., J.-E. Haugen and M. Schlabach. Ambient air levels of persistent organochlorines in spring 1992 at Spitsbergen and the Norwegian mainland: comparison with 1984 results and quality control measures 139

Paliouris, G., H.W. Taylor, R.W. Wein, J. Svoboda and B. Mierzynski. Fire as an agent in redistributing fallout ^{137}Cs in the Canadian boreal forest 153

Peters, A.J., D.J. Gregor, C.F. Teixeira, N.P. Jones and C. Spencer. The recent depositional trend of polycyclic aromatic hydrocarbons and elemental carbon to the Agassiz Ice Cap, Ellesmere Island, Canada 167

Prospero, J.M., D.L. Savoie, R. Arimoto, H. Olafsson and H. Hjartarson. Sources of aerosol nitrate and non-sea-salt sulfate in the Iceland region 181

Rovinsky, F., B. Pastukhov, Y. Bouyvolov and L. Burtseva. Present day state of background pollution of the natural environment in the Russian Arctic in the region of the Ust-Lena Reserve. 193

Voldner, E.C. and Y.-F. Li. Global usage of selected persistent organochlorines 201

Wania, F. and D. Mackay. A global distribution model for persistent organic chemicals 211

Distribution of contaminants in the Arctic biosphere

Boutron, C.F., J.-P. Candelone and S. Hong. Greenland snow and ice cores: unique archives of large-scale pollution of the troposphere of the Northern Hemisphere by lead and other heavy metals. 233

Steinnes, E. A critical evaluation of the use of naturally growing moss to monitor the deposition of atmospheric metals 243

Bright, D.A., W.T. Dushenko, S.L. Grundy and K.J. Reimer. Evidence for short-range transport of polychlorinated biphenyls in the Canadian Arctic using congener signatures of PCBs in soils 251

Bright, D.A., W.T. Dushenko, S.L. Grundy and K.J. Reimer. Effects of local and distant contaminant sources: polychlorinated biphenyls and other organochlorines in bottom-dwelling animals from an Arctic estuary 265

Buznikov, A.A., I.I. Payanskaya-Gvozdeva, T.K. Jurkovskaya and E.N. Andreeva. Use of remote and ground methods to assess the impacts of smelter emissions in the Kola peninsula 285

Cooper, L.W., J.M. Grebmeier, I.L. Larsen, C. Solis and C.R. Olsen. Evidence for re-distribution of ^{137}Cs in Alaskan tundra, lake and marine sediments 295

Elkin, B.T. and R.W. Bethke. Environmental contaminants in caribou in the Northwest Territories, Canada 307

Ford, J., D. Landers, D. Kugler, B. Lasorsa, S. Allen-Gil, E. Crecelius and J. Martinson. Inorganic contaminants in Arctic Alaskan ecosystems: long-range atmospheric transport or local point sources? 323

Gabrielsen, G.W., J.U. Skaare, A. Polder and V. Bakken. Chlorinated hydrocarbons in glaucous gulls (*Larus hyperboreus*) in the southern part of Svalbard 337

Gubala, C.P., D.H. Landers, M. Monetti, M. Heit, T. Wade, B. Lasorsa and S. Allen-Gil. The rates of accumulation and chronologies of atmospherically derived pollutants in Arctic Alaska, USA. . . 347

Gústafsson, L.E. and K. Steinecke. Airborne contaminants and their impact on the city of Reykjavík, Iceland 363

Johansson, K., A. Andersson and T. Andersson. Regional accumulation pattern of heavy metals in lake sediments and forest soils in Sweden. 373

Kidd, K.A., D.W. Schindler, R.H. Hesslein and D.C.G. Muir. Correlation between stable nitrogen isotope ratios and concentrations of organochlorines in biota from a freshwater food web 381

Langlois, C. and R. Langis. Presence of airborne contaminants in the wildlife of northern Québec . . 391

Leggett, D.C. and A.W. Hogan. A preliminary experiment to examine chemical exchange at the soil-snow interface 403
Letcher, R.J., R.J. Norstrom and Å. Bergman. Geographical distribution and identification of methyl sulphone PCB and DDE metabolites in pooled polar bear (*Ursus maritimus*) adipose tissue from western hemisphere Arctic and subarctic regions 409
Lode, O., O.M. Eklo, B. Holen, A. Svensen and Å.M. Johnsen. Pesticides in precipitation in Norway. 421
Mannio, J., O. Järvinen, R. Tuominen and M. Verta. Survey of trace elements in lake waters of Finnish Lapland using the ICP-MS technique 433
Mehlum, F. and F.F. Daelemans. PCBs in Arctic seabirds from the Svalbard region 441
Muir, D.C.G., N.P. Grift, W.L. Lockhart, P. Wilkinson, B.N. Billeck and G.J. Brunskill. Spatial trends and historical profiles of organochlorine pesticides in Arctic lake sediments 447
Norokorpi, Y. and H. Frank. Trichloroacetic acid as a phytotoxic air pollutant and the dose-response relationship for defoliation of Scots pine. 459
Polischuk, S.C., R.J. Letcher, R.J. Norstrom and M.A. Ramsay. Preliminary results of fasting on the kinetics of organochlorines in polar bears (*Ursus maritimus*). 465
Poole, K.G., B.T. Elkin and R.W. Bethke. Environmental contaminants in wild mink in the Northwest Territories, Canada 473
Rose N.L. Carbonaceous particle record in lake sediments from the Arctic and other remote areas of the Northern Hemisphere. 487
Savinova, T.N., A. Polder, G.W. Gabrielsen and J.U. Skaare. Chlorinated hydrocarbons in seabirds from the Barents Sea area 497
Vetter, W. and B. Luckas. Theoretical aspects of polychlorinated bornanes and the composition of toxaphene in technical mixtures and environmental samples 505
Wilson, R., S. Allen-Gil, D. Griffin and D. Landers. Organochlorine contaminants in fish from an Arctic lake in Alaska, USA. 511

Human health issues

Bjerregaard, P. Health and environment in Greenland and other circumpolar areas. 521
Ayotte, P., É. Dewailly, S. Bruneau, H. Careau and A. Vézina. Arctic air pollution and human health: what effects should be expected? 529
Careau, H. and E. Dewailly. The northern aquatic food chain contamination database: a research tool. 539
Hasselblad, V. Meta-analysis of environmental health data 545
Hild, C.M. The next step in assessing Arctic human health. 559
Luoma, P.V., S. Näyhä, L. Pyy and J. Hassi. Association of blood cadmium to the area of residence and hypertensive disease in Arctic Finland 571
Lundqvist, G.R. Total exposure from outdoor and indoor air pollution in the Arctic. 577
Revich, B.A. Public health and ambient air pollution in Arctic and subarctic cities of Russia. 585

Arctic ecosystem responses to atmospheric contaminants

Alexander, V. The influence of the structure and function of the marine food web on the dynamics of contaminants in Arctic Ocean ecosystems. 593
Alexeyev, V.A. Impacts of air pollution on far north forest vegetation. 605

Olsson, M. Ecological effects of airborne contaminants in Arctic aquatic ecosystems: a discussion on methodological approaches 619
Lockhart, W.L. Implications of chemical contaminants for aquatic animals in the Canadian Arctic: some review comments 631
Alexeeva-Popova, N.V., T.I. Igoshina and I.V. Drosdova. Metal distribution in the Arctic ecosystems of the Chukotka Peninsula, Russia 643
Allen-Gil, S.M. and V.G. Martynov. Heavy metal burdens in nine species of freshwater and anadromous fish from the Pechora River, northern Russia 653
Doubleday, N.C., M.S.V. Douglas and J.P. Smol. Paleoenvironmental studies of black carbon deposition in the High Arctic: a case study from Northern Ellesmere Island 661
Gruzdev, A.N. Possible changes in the dose of biologically active ultraviolet radiation received by the biosphere in the summertime Arctic, due to total ozone interannual variability 669
Jónsdóttir, I.S., T.V. Callaghan and J.A. Lee. Fate of added nitrogen in a moss-sedge Arctic community and effects of increased nitrogen deposition 677
Kämäri, J., M. Posch, A.-M. Kähkönen and M. Johansson. Modeling the long-term response of a small catchment in Lapland to changes in sulfur deposition 687
Lien, L., A. Henriksen, T.S. Traaen. Critical loads of acidity to surface waters: Svalbard 703
Moiseenko, T.I., L.P. Kudryavtseva, I.V. Rodyushkin, V.S. Dauvalter, A.A. Lukin and N.A. Kashulin. Airborne contamination by heavy metals and aluminium in the freshwater ecosystems of the Kola subarctic region (Russia) 715
Nash, T.H., III and C. Gries. The use of lichens in atmospheric deposition studies with an emphasis on the Arctic 729
Nash, T.H., III and C. Gries. The response of lichens to atmospheric deposition with an emphasis on the Arctic 737
Nifontova, M. Radionuclides in the moss-lichen cover of tundra communities in the Yamal Peninsula 749
Tømmervik, H., B.E. Johansen and J.P. Pedersen. Monitoring the effects of air pollution on terrestrial ecosystems in Varanger (Norway) and Nikel—Pechenga (Russia) using remote sensing 753

Contaminant relationship to climate change

Kellogg, W.W. Contaminants affecting the Arctic climate, and the role of the oceans 769
Curry, J.A. Interactions among aerosols, clouds and climate of the Arctic Ocean 777
Blanchet, J.-P. and É. Girard. Water vapour-temperature feedback in the formation of continental Arctic air: its implication for climate 793
Corazza, E. and G. Tesi. Tropospheric hydrogen and carbon oxides in Antarctica and in Greenland . 803
Pueschel, R.F. and S.A. Kinne. Physical and radiative properties of Arctic atmospheric aerosols 811
Stamnes, K., B. Zak and G.E. Shaw. The Atmospheric Radiation Measurements (ARM) Program: ARM's window on the Arctic 825
Yurganov, L.N., E.I. Grechko and A.V. Dzhola. Carbon monoxide and total ozone in Arctic and Antarctic regions: seasonal variations, long-term trends and relationships 831

Information gaps and research needs

Landers, D.H., G. Bangay, H. Sisula, T. Colborn and L.-E. Liljelund. Airborne contaminants in the Arctic: what we need to know 841
Perkins, P.E. An overview of international institution mechanisms for environmental management with reference to Arctic pollution 849

Author Index 859

Subjct Index 863